Water and Electricity

Why Should You Care?

Normally as we turn on the lawn sprinkler we don't think, "This will cost me $1.10 an hour"; nor, when a light is left burning overnight, "I just wasted 14 cents."

There are many reasons to use energy wisely. One is the impact on our wallets when we pay for misused energy. We pay immediately on utility bills and in the long term on tax bills to install generating stations, water and sewage treatment plants and transmission lines.

Concern for the environment is another reason. Production and use of energy leads to environmental problems. More than 90 per cent of Alberta's electricity is produced by burning coal, a major contributor of carbon dioxide (CO_2), which is thought to contribute to global warming. The pumping, treatment, delivery and heating of water uses energy. You can help reduce the amount of CO_2 released into the atmosphere by cutting down the amount of water and electricity you use.

In Alberta the largest portion of residential utility cost is for heating but electricity and water are also large factors.

Figure 1 shows relative costs of utilities in the average Alberta urban home. Utility bills vary among communities and customers, but usually electricity and water together cost more than space heating.

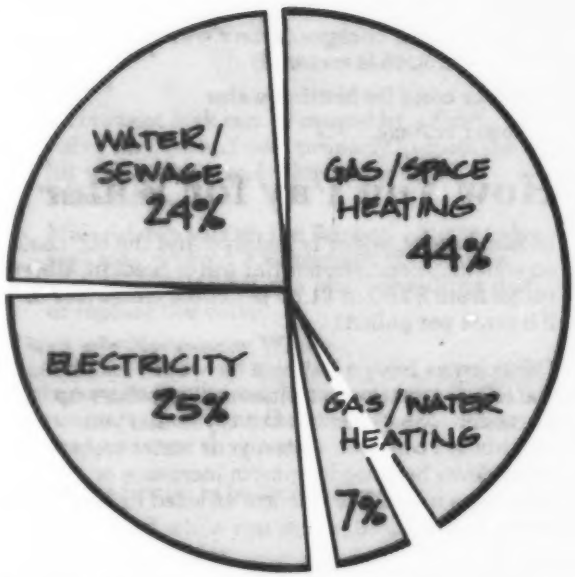

Figure 1 Annual Utility Costs

In 1988, natural gas costs for space heating average $600 per year; water heating $90; electricity $350; and water and sewer $330.

How Much Can You Save?

Simple—often free—steps can trim at least $50 a year from your electric bill. Equally simple steps can reduce water consumption by some 30 per cent, a saving of $95 per year.

Different steps will save different amounts—some modest, some substantial. There is no single way to slash energy bills, but knowing how to save small amounts can achieve significant overall savings.

Water

Water is not a form of energy but does require energy to pump, treat, deliver and heat the one billion litres (225 million gallons) used each day by Albertans.

In urban areas you pay for water twice: once for water, once for sewage treatment. Treatment costs are based on water consumption and can add at least 50 per cent to the cost of water. When you cut back water consumption, savings are made in a number of ways:

- lower water charges (where water consumption is metered)
- lower costs for heating water
- lower sewage costs

How You Pay for Water

In some areas, water is metered and the bill based on consumption...residential water costs in Alberta range from $0.80 to $1.80 per cubic metre (0.4 to 0.8 cents per gallon).

Other areas have a flat rate for water. Individual water conservation activities will not show up immediately on your bill but if you and your neighbours conserve water, your water costs will come down because long-term increases or decreases in the flat rate are affected by total area consumption.

You could consider installing a meter if the option is available in your area and probably reduce your water bill below the flat rate.

If you use a well, the value of water conservation may be hard to calculate. If water is limited conservation may be necessary. Reduced pumping costs, septic field saturation and wear and tear on the pump components are potential benefits.

The following metric conversions may be useful:

- 1 Imperial gallon = 4.54 litres
- 1 cubic metre = 1000 litres
- 1 cubic metre = 220 Imperial gallons

Where Does the Water Go?

The flip answer is "down the drain." But knowing which drain—bathtub, kitchen sink, toilet—will help develop priorities for water conservation.

The typical household uses 750 litres (165 gallons) of water daily. Figure 2 illustrates where it is used in the average home. Figure 3 shows how much water is used for typical activities.

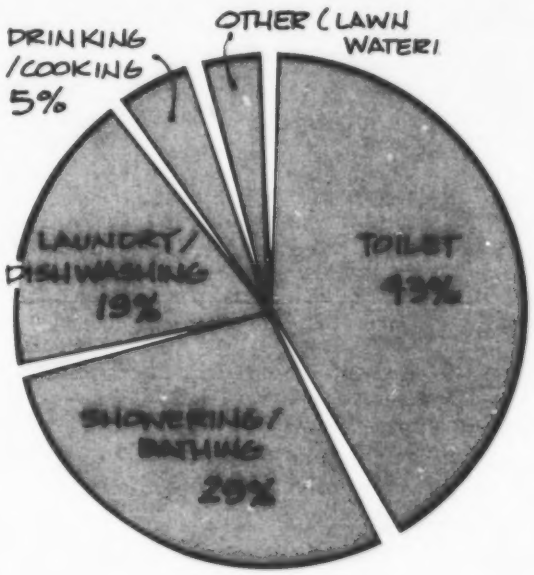

Figure 2 Average Water Use

The toilet uses the most water. Showering/bathing is next.

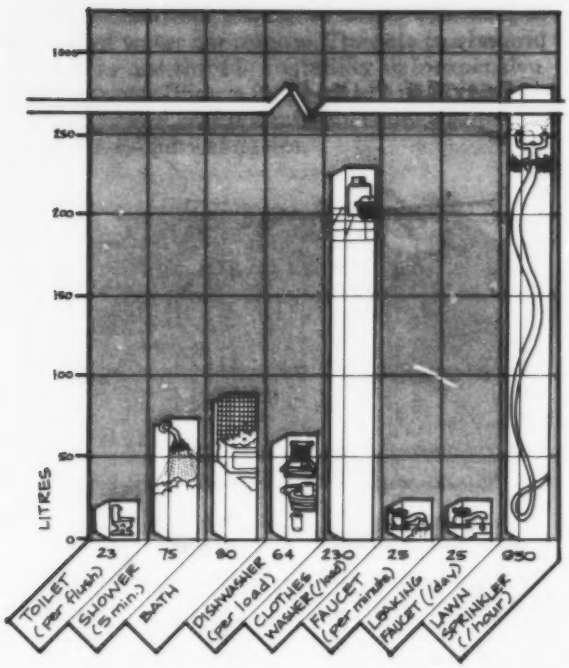

Figure 3 Water Users

Washing one full load of laundry uses 230 litres (50 gallons) of water, an incentive to use partial load settings for smaller loads.

Steps to Saving

Water conservation steps are in three broad categories:

- no-cost changes to maintenance or operation
- modifications (often inexpensive) to fixtures
- installing new systems

No-Cost Changes

Check for Leaks

A dripping faucet wastes 8640 litres (1900 gallons) a year (plus energy if it is hot water). Faucets can be repaired easily by replacing the washers.

A leaking toilet wastes even more water:

- Check the toilet bowl for a continuous stream of water coming from the tank. To check for slow leaks put some food colouring in the tank and see if it appears in the bowl.
- A leak may result when the intake valve doesn't close completely (Figure 4). Adjust the float to be lower in the water by bending the arm carefully or by turning the adjusting screw over the intake valve.

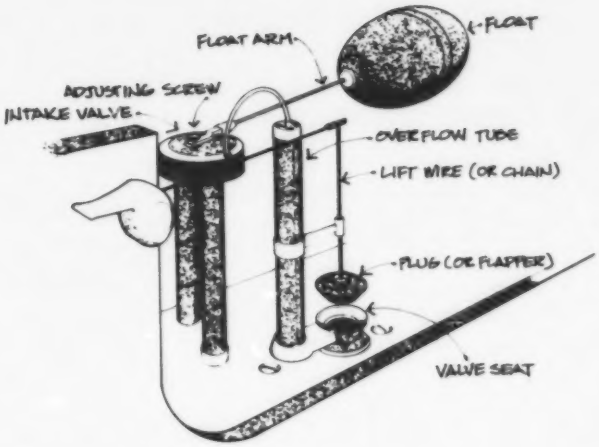

Figure 4

- A constant leak can be caused by a flush valve that doesn't seat properly. Adjust the lift wires, chain and other parts of the mechanism.
- Mineral deposits on the flapper, plug or valve seat may prevent a watertight fit. Remove with fine steel wool or a plastic scouring pad; or replace the valve.

Use Only Necessary Water

This may seem obvious, but we all may flush a tissue instead of using the waste basket or leave a tap on to answer the phone.

Train the family to be aware of water:

- Turn it off while you shave, brush your teeth, scrub vegetables.
- Water the lawn sensibly: two hours sprinkling is sufficient, longer, and the water runs off. Avoid windy days or at mid-day, as evaporation is high. Watering once a week in early morning or evening is best.
- Wash full loads of laundry or adjust the water level to suit the load. Use cold water for lightly soiled or brightly coloured clothes and always rinse with cold water. Save up to $5 a year by switching to cold water washing, one load a week; two loads a week could save up to $10.

Take Charge of Your Water Heater

The recommended temperature setting for your hot water tank is 50°C (120°F), about as hot as your hand can tolerate. If your dishwasher doesn't have a preheater, the setting should be 60°C (140°F). Turning down the setting 10°C can mean annual savings of $20. If you have an electric

water heater, lower the temperature by shutting off the power, remove the cover plates over the elements and make the adjustments with a screwdriver.

The lower temperature can also be a safety factor, preventing hot water burns.

If you are going on holidays turn down the thermostat to its lowest setting.

Drain the sediment and minerals from your hot water tank every month or two. The residue acts as an insulator, making your heater work harder (Figure 5). NOTE: If the drain valve does not open easily, do not force it.

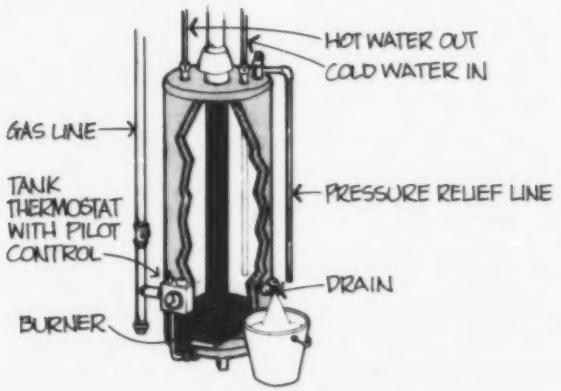

Figure 5

Modifications to Fixtures

Install a Toilet Water Saver

A toilet dam (Figure 6) reduces the water per flush up to 30 per cent, while maintaining the depth needed for effective flushing.

Other adjustable water-saving devices that attach to the fill valve assembly can save up to 50 per cent per flush (Figure 7). The Energy Matters telephone service can tell you where to purchase them. Dial 0 and ask for Zenith 22339 (Edmonton 427-5300).

Because the toilet is the single heaviest water user, potential savings are considerable compared to the cost of water savers. Payback is usually less than one year.

These devices can affect the performance of your toilet so it is essential to install them to the manufacturer's directions. Once in place they require adjustment to be sure the toilet flushes properly.

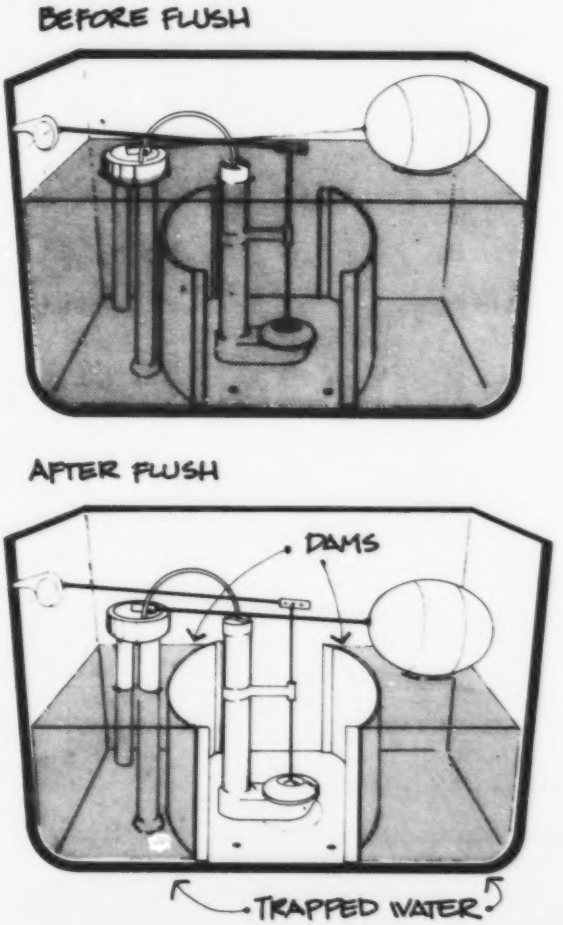

Figure 6

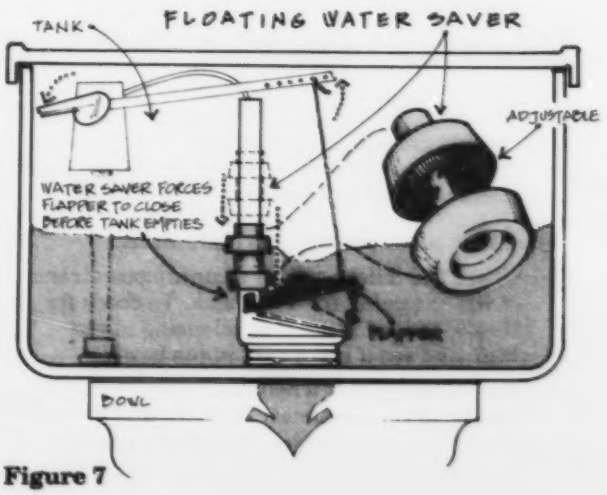

Figure 7

Reduce the Amount of Water Through Your Showerhead

A showerhead normally delivers about 15 litres (3 gallons) of water per minute. The rate can be reduced by one-third by installing an inexpensive flow restrictor (Figure 8). There are two types of flow restrictors, one resembles a small washer, the other is a cylindrical device.

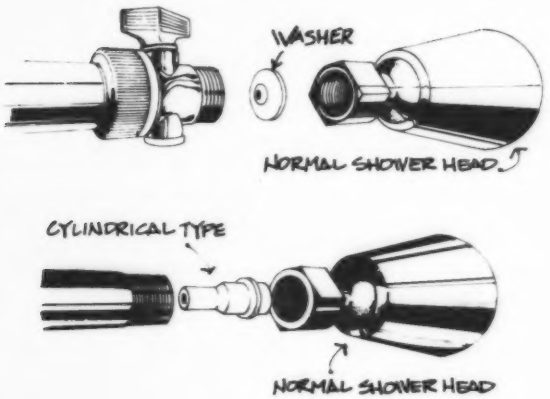

Figure 8

If you prefer a vigorous shower, buy a controlled-flow showerhead. Yearly savings are about $30 in water and sewage charges for a family of four, plus energy savings for heating shower water.

Insulate Your Hot Water System

Heat loss accounts for about 15 per cent of water heating cost. Wrapping the hot water tank and pipes with insulation reduces the loss to 4 per cent.

Older tanks, in particular, benefit. You can purchase a kit or use foil-faced fibreglass duct insulation (Figure 9).

When insulating a gas water heater, be sure the top is not covered and the draft hood is not blocked. Also do not cover the air inlet, the controls or the operating instructions for the burner and pilot light. Make sure the insulation is securely fastened and won't come loose and cover the air inlet or controls.

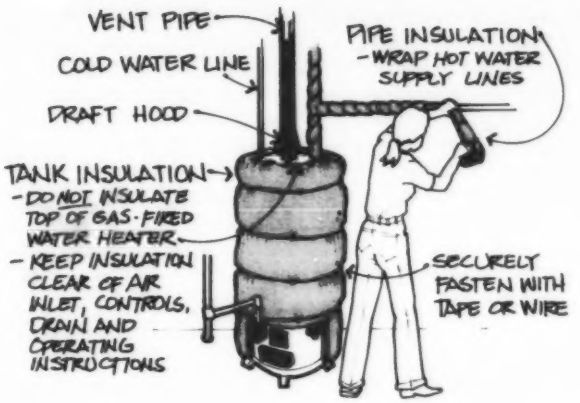
VENT PIPE
COLD WATER LINE
DRAFT HOOD
TANK INSULATION
- DO NOT INSULATE TOP OF GAS-FIRED WATER HEATER
- KEEP INSULATION CLEAR OF AIR INLET, CONTROLS, DRAIN AND OPERATING INSTRUCTIONS
PIPE INSULATION
- WRAP HOT WATER SUPPLY LINES
SECURELY FASTEN WITH TAPE OR WIRE

Figure 9

Insulating hot water lines reduces water use since less water is used to bring hot water to a faucet.

Insulate Your Hot Tub

A hot tub or spa with a gas heater uses between $7 and $12 worth of energy per month. This can be reduced 40 per cent by using an insulated cover, adding insulating skirting to built-in models, and wrapping the pipes.

Installing New Systems

Select a Low-Flush Toilet

Low-flush toilets that use one-half to 14 litres (1 pint to 3 gallons) of water per flush instead of the conventional 23 to 27 litres (5 to 6 gallons) are available. To eliminate water use consider a composting toilet.

Select Water Heater Location

To reduce heat loss through long runs of piping, locate a new hot water tank near areas where the most hot water is used.

Select a New Water Heater Carefully

Match the size of a new water heater to the needs of your family. An over-sized unit wastes energy.

More efficient water heaters are available. There are several options.

Improved efficiency gas-fired hot water tanks come in two types. One type is an induced draft unit using the same principles of operation as the medium-efficiency furnace. It vents out the side of the house eliminating the need for a chimney and, therefore, chimney heat loss. Another type is a "contained combustion" water heater (Figure 10). Outside air enters the vent system's outer channel to supply combustion air. The products of combustion are expelled to the outside through the vent system's inner channel.

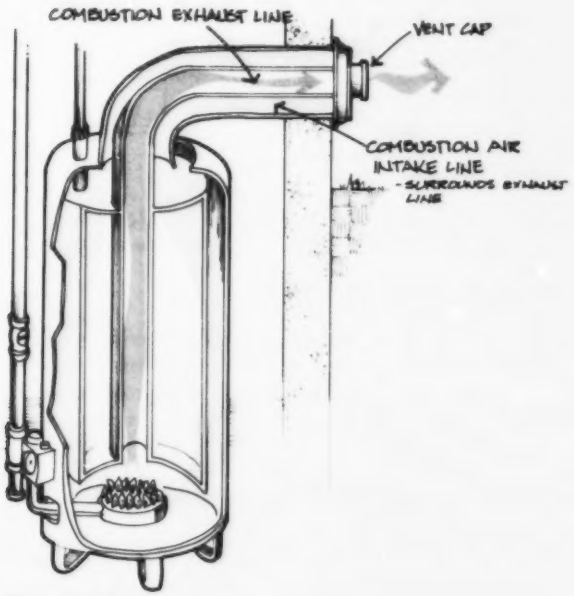

Figure 10

Manufacturers are claiming seasonal efficiencies of 75 per cent, which is a significant improvement over conventional units.

Instantaneous or tankless water heaters heat the water as it is being used. Standby losses associated with conventional water tanks (energy wasted to keep water warm when it is not being used) and hot water line losses are eliminated resulting in improved efficiency and lower hot water bills. Gas-fired tankless units have efficiencies of 75 per cent to 80 per cent. They normally generate a maximum of 2 to 4 gallons per minute of hot water. This may be enough for a small family, but a large family with lots of clothes washing, dishwashing, showers and baths might find that there is not enough hot water production to meet the demand.

Companion hot water tanks are available with some high efficiency furnaces and with boiler-assisted heating systems. Hot water or glycol from the heater can be circulated through the coil in the tank to heat the water. If the heater is fairly efficient, it will provide more efficient water heating than with a conventional hot water tank.

Another option is solar water heating. Performance data shows that solar collectors contribute 40 per cent to 50 per cent of the annual water heating load for an average home. This means that solar collectors might save $40 to $50 per year in a house that uses natural gas as a fuel. Economically, it is difficult to justify these kinds of savings, since normally one will still require a conventional backup system.

Electricity

Compared to other sources of energy, electricity is the most expensive. It makes sense to use it carefully.

The average Alberta household uses 7100 kilowatt hours of electricity per year, more in rural areas. Figure 11 shows the categories of electric energy use. Figure 12 compares monthly consumption of appliances.

Appliances which operate on a continuous basis—refrigerators, furnace fans, waterbed heaters—consume large amounts of energy and are areas where you can achieve significant savings.

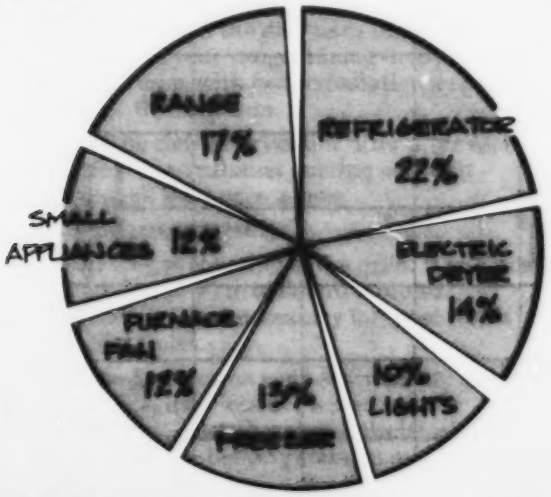

Figure 11 Average Electric Use

How You Pay for Electricity

The basic unit of electric consumption is the kilowatt hour (kW.h). A kilowatt hour is the amount of energy consumed by a load of one kilowatt (which equals 1000 watts) operating for one hour. For example, a 100-watt light bulb takes 10 hours to consume 1000-watt hours or 1 kW.h of electric energy (100 x 10 = 1000).

Estimate the cost of operating an appliance by using the average monthly consumption shown in Figure 12. Multiply the number of kilowatt hours the appliance uses by the cost per kW.h. In Alberta this is about five cents per kW.h for residential customers. Check with your electric utility for the exact rate.

Steps to Saving

The steps to cut back electricity consumption fall into three broad categories:

- no-cost changes in the way you use or maintain appliances
- modifications to appliances, often done at modest cost
- installing new electrical equipment

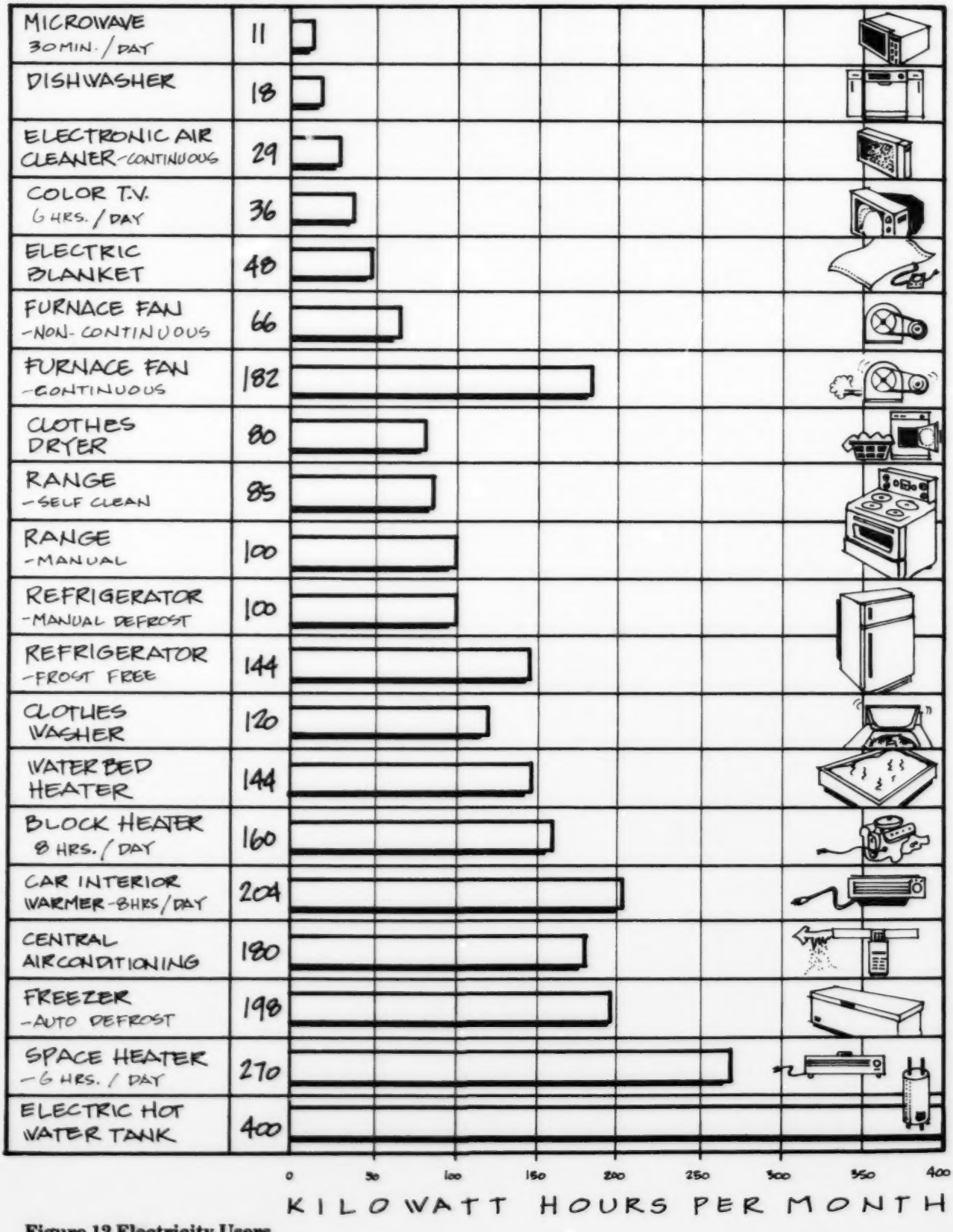

Figure 12 Electricity Users

No-Cost Changes

Maintain Your Appliances

Basic maintenance to ensure appliances are not working any harder than necessary is an excellent way to cut electric costs.

- Vacuum the coils at the back or bottom of your fridge regularly. Dust interferes with efficiency. Keep air circulating inside the fridge - i.e., don't overload it or line the shelves with foil.
- Make sure the rubber gasket sealing the door is clean and in good condition. Close the door on a piece of thin paper. If you pull the paper out with little resistance, some cold air is escaping and the door needs adjustment.
- Defrost the refrigerator or freezer when ice build-up reaches 6mm (¼ inch) by removing the food and thawing the ice build-up.
- Clean the agitator and the filters of both water hose inlets on the back of your clothes washer.
- Regularly clean the drip pans under the elements of your range. Lining drip pans with foil interferes with heat circulation and can damage the elements.
- Clean the clothes dryer lint filter after each use and clean exhaust ducting and vent damper at least once a year.

Use Appliances Wisely

- Avoid long preheating of the oven. It will heat to 180°C (350°F) in about 10 minutes. Preheating is not necessary for most roasts and casseroles.
- Use the features on your dishwasher. The short cycle uses less hot water and the energy-saver switch reduces electrical use by turning off the heating element so that the dishes air dry.
- Don't overload your clothes dryer. Use the setting that will not overdry your clothes.

Get Mother Nature on Your Side

Make the most of your appliances: don't have them working against you:

- Place the fridge away from direct sunlight or other heat source, i.e. the kitchen range.
- Cool hot foods to room temperature before putting the fridge to work. Cold water can help cool food quickly.
- Place furniture to take advantage of natural light. Light-coloured walls and ceilings increase lighting effectiveness.
- Help your air conditioner; close windows and curtains during the day and open them at night.

Use Small Appliances

Small appliances—toaster ovens, crockpots, microwave ovens—use less energy:

- It takes 18 times the electricity to bake a potato in a regular oven than in a microwave.
- A toaster is three times as efficient as your range.

Modifications to Existing Appliances

Get Time on Your Side

Timers are inexpensive and help cut electricity use:

- Research shows your car's block heater needs to be on for just three hours to ensure quick, reliable starts, even on Alberta's coldest days. Leaving a 600-watt heater on from six p.m. to seven a.m. wastes $8 of electricity a month.
- Similar savings can result with a power-saver cord which allows the block heater to operate only when the temperature falls below 2°C(35°F).
- An automatic timer which turns your thermostat down at night or when you are away will save both fuel and electricity.
- An automatic timer on your waterbed heater can turn the thermostat down during the day. Keep the bed covered to retain heat.

Purchase Fluorescent Fixtures

Fluorescent lighting is up to four times more efficient than incandescent bulbs of the same wattage and fluorescent tubes last up to 10 times longer.

Fluorescent units that will screw into conventional light bulb sockets are now available. Using warm white fluorescent tubes and diffusing screens or shades can make fluorescent lighting as pleasant as incandescent.

Modify Other Lighting

Three-way or dimmer switches allow you to use less light when you wish and higher light levels when you need them. Dimmers prolong bulb life.

Low-watt general lighting combined with bright lighting for specific work areas is an effective method of saving electricity.

Install High-Density Discharge Lights for Yard Lighting

When bright illumination is needed outdoors (i.e., in a farmyard), consider high or low pressure sodium bulbs. Sodium bulbs are available in the 50-W to 150-W range.

High-pressure bulbs give off a golden-white light, low-pressure bulbs, a yellow light. High-pressure bulbs are less efficient than low-pressure, but both are considerably better than mercury-vapour or incandescent bulbs.

Installing New Equipment

Look for Efficient Appliances

The greatest electrical savings can be made by buying the most efficient appliances. One refrigerator may cost as much as $35 per year less to operate than another. Over the life of the appliance, the savings can be considerable.

When you shop, check the comparative efficiency of various models and brands.

One way is to check the "Energuide" or equivalent label (Figure 13). It indicates the kilowatt hours that the appliance typically uses per month. Multiply this by your utility rate to determine the average monthly cost.

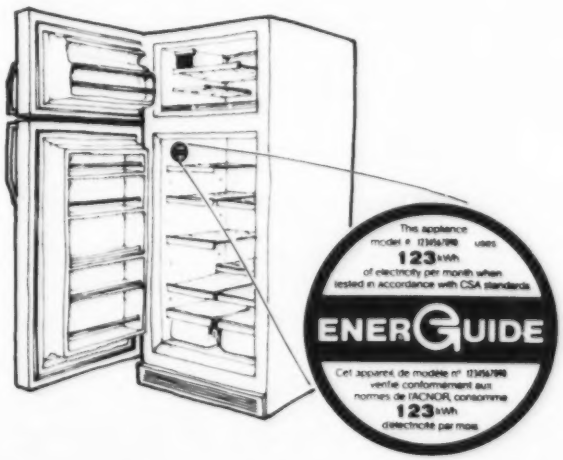

Figure 13

Other considerations when choosing appliances:

- With dishwashers, compare the amount of water required by different models. Those using less water save on your water bill and many have electric booster water heaters to save electricity. Selecting a dishwasher with a booster heater allows you to keep your hot water tank at a lower temperature.
- When buying a clothes washer, look for models with water level and water temperature controls. Consider using a front-loading model. They use considerably less hot water than top-loading types.
- Look for energy-efficient features such as moisture sensor control, cool down cycle and electronic ignition when purchasing a clothes dryer. A moisture sensor cuts energy use by 10 to 15 per cent and is more accurate and effective than a temperature sensor or timer.

- Consider a convection oven. It has a fan that circulates air evenly, eliminating hot and cold spots. Cooking temperatures can be lowered and cooking times can be shortened.
- An upright freezer costs more to operate than a chest-type because cold air spills out. Frost-free models cost more to run than manual defrost.
- Check the amount of insulation used in refrigerators or freezers. Some freezers have 6.4 cm (2.5 inches) instead of the customary 5 cm (2 inches) of foam insulation.
- Appliances should match the size of your family. Over-sized appliances waste energy dollars.

Summary

The amount of water and electricity you use affects the amount you pay on your utility bills and has environmental implications. It pays to be more aware of how you use these resources.

Most of the energy saving steps mentioned in this booklet are free or low-cost, but can result in annual savings of between $50 and 150. Still larger savings are possible when you buy new equipment or appliances.

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